

NATIONAL SHIPBUILDING RESEARCH PROGRAM

U.S. DEPARTMENT OF TRANSPORTATION

MARITIME ADMINISTRATION

in cooperation with

BATH IRON WORKS CORPORATION

NOVEMBER 2, 1981

NATIONAL SHIPBUILDING STANDARDS PROGRAM

STATUS REPORT NO. 3

#6

| Report Documentation Page  |                                    |                                     |  | Form Approved<br>OMB No. 0704-0188       |                                 |
|--|------------------------------------|-------------------------------------|--|--|---------------------------------|
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| 1. REPORT DATE<br><b>02 NOV 1981</b>   |                                    | 2. REPORT TYPE<br><b>N/A</b>        |  | 3. DATES COVERED<br><b>-</b>             |                                 |
| 4. TITLE AND SUBTITLE<br><b>National Shipbuilding Standards Program Status Report NO. 3</b>  |                                    |                                     |  | 5a. CONTRACT NUMBER                      |                                 |
|  |                                    |                                     |  | 5b. GRANT NUMBER                         |                                 |
|  |                                    |                                     |  | 5c. PROGRAM ELEMENT NUMBER               |                                 |
| 6. AUTHOR(S)   |                                    |                                     |  | 5d. PROJECT NUMBER                       |                                 |
|  |                                    |                                     |  | 5e. TASK NUMBER                          |                                 |
|  |                                    |                                     |  | 5f. WORK UNIT NUMBER                     |                                 |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><b>Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128 9500 MacArthur Bldg Bethesda, MD 20817-5700</b>  |                                    |                                     |  | 8. PERFORMING ORGANIZATION REPORT NUMBER |                                 |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)  |                                    |                                     |  | 10. SPONSOR/MONITOR'S ACRONYM(S)         |                                 |
|  |                                    |                                     |  | 11. SPONSOR/MONITOR'S REPORT NUMBER(S)   |                                 |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release, distribution unlimited</b>  |                                    |                                     |  |  |                                 |
| 13. SUPPLEMENTARY NOTES  |                                    |                                     |  |  |                                 |
| 14. ABSTRACT   |                                    |                                     |  |  |                                 |
| 15. SUBJECT TERMS  |                                    |                                     |  |  |                                 |
| 16. SECURITY CLASSIFICATION OF:  |                                    |                                     | 17. LIMITATION OF ABSTRACT<br><b>SAR</b> | 18. NUMBER OF PAGES<br><b>18</b>         | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT<br><b>unclassified</b>   | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b> |  |  |                                 |

## STATUS REPORT NO. 3

### EXECUTIVE SUMMARY

#### Recent Developments

By consensus approval of SNAME Panel SP-6 and with the concurrence of the governing Ship Production Committee, the FY-82 standards program has been prepared and submitted to the Maritime Administration for funding under the Ship Producibility Program. The FY-82 shipbuilding standards and specifications program includes the following tasks.

- Task S-32, "Standard Bid Response Sheets"
- Task S-33, "Mechanical Design/Construction Standards-IV"
- Task S-34, "Commercialization of General Specifications  
for Ships of the United States Navy"
- Task S-35, "Hull Design/Construction Standards-II"
- "Long Range Plan Implementation, Phase I"
- FY-82 Special Development Project Funding

In addition to the above, the Design Agent firm of J. J. McMullen Associates has undertaken the task of developing a set of functional design drawings for subsystem components which should result in improved productivity through application of zone outfitting and outfit package concepts. This marks the first time that a firm other than a shipbuilder has become a participant in the standards program effort.

#### Accomplishments

Currently there are over seventy shipbuilding standards in various stages of development under the voluntary consensus ballot system. Twelve have been approved and published as ASTM National Standards. A documented 83% of these are being used in new shipbuilding contracts resulting in an immediate multiple payback situation relative to the initial R & D investment. Several shipyards are now involved in new or expanded internal standards programs particularly where advanced shipbuilding techniques are being applied.

### NAVSEA Involvement

U.S. Navy support of, and participation in the standards program has become even more pronounced this year, primarily due to the efforts of RAdm. E. J. Otth, Naval Sea Systems Deputy Commander for Acquisition and Vice-Chairman of ASTM Committee F-25, up to the time of his retirement in June, 1981. His successor at NAVSEA, RAdm. J. W. Lisanby, has indicated his intention to provide the same high degree of support. RAdm. Otth's replacement as Vice-Chairman of Committee F-25 is RAdm. T. M. Hopkins, who is currently NAVSEA Deputy Commander for Ship Systems. The first ASTM shipbuilding standard has been incorporated in the Navy GENSPECS and formal procedures have been established to ensure ongoing Navy review and assessment of those commercial standards for Navy use. This trend towards cooperative standardization is expected to continue and even increase.

### U.S. Shipbuilding Standards Long Range Plan

The long range plan is intended to provide the basis for a standardization program covering near term, mid-term and long term goals. The final report, which is expected to be completed by the end of this year, will recommend program priorities and procedures to implement the plan on the national, industry-wide, and individual shipyard levels.

### Public Relations Activities

Efforts are continually being made to publicize the progress and status of the National Shipbuilding Standards Program through such forums as the Institute for Research and Engineering for Automation and Productivity in Shipbuilding Symposium (IREAPS), the American Defense Preparedness Association, joint Society of Naval Architects and Marine Engineers/American Society of Naval Engineers meetings, the ASTM workshop series, and the various trade publications.

The June, 1981 issue of ASTM's "Standardization News" highlighted the third anniversary of Committee F-25 on Shipbuilding and its activities in the National Shipbuilding Standards/Research Program. In-depth interviews with Mr. R. J. Taylor, Chairman of Committee F-25, and with RAdm. E. J. Otth, USN, were featured in this edition.

Also being prepared is a fifteen-minute sound/slide documentary which will feature the standards program in general and the long range plan in particular to promote industry awareness and support of the program.

### Summary

Significant advances in standards development and implementation have been accomplished during the past year. The introduction of the formal long range plan recommendations contained in IHI Marine Technology's final report should provide the U.S. shipbuilding industry with renewed stimulus for standards evolution over the next decade. The standards program continues to attract representatives from every segment of the industry resulting in a truly integrated effort which is yielding outstanding benefits in reducing shipbuilding costs and schedule durations.

# NATIONAL SHIPBUILDING STANDARDS PROGRAM

## STATUS REPORT NO. 3

### PART I MARAD/INDUSTRY STANDARDS PROGRAM

#### SNAME Panel SP-6

As a direct result of industry awareness and interest in the benefits resulting from the MarAd funded National Shipbuilding Standards Program, membership in SNAME Panel SP-6 has increased from nine to nineteen active organizational members including for the first time a firm other than a shipbuilder: J. J. McMullen Associates. Other design agents have expressed interest in acquiring membership on the panel and by the end of the year it is expected that at least two more and perhaps even four design agents will become active on Panel SP-6.

The FY-80/81 program is substantially completed and many of the elements comprising individual tasks have been referred to ASTM Committee F-25 for processing as voluntary consensus standards. One of the tasks involved was the "Weld Defect Tolerance Study" which developed a rationale for establishing weld inspection acceptance criteria based on the principles of fracture mechanics rather than using outdated empirical workmanship-based standards. The Navy Department requested that a supplementary study be made to determine the feasibility of applying the fitness for service concept to naval ship construction, and currently NAVSEA is formulating a weld defect tolerance program based on the data contained in the "Weld Defect Tolerance Study." The implications of this effort have the greatest significance, because it is anticipated that the conclusions of the study will be corroborated by NAVSEA and that the results of their investigations will generate tremendous interest in the commercial sector for implementing the fitness for service concept resulting in savings of up to a million dollars per ship.

#### FY-82 Program

The FY-82 Standards Program Proposals include six new high priority tasks which will involve cooperative agreements with three major shipyards and the design agent firm of J. J. McMullen Associates. It should be noted that two-thirds of the proposed efforts will be accomplished by new SP-6 members participating in such work for the first time.

The specific FY-82 project recommendations are intended to support ongoing progress in the standards program and provide a bridge to implement projects in new areas based on known priorities

and anticipated recommendations of the Standards Program Long-Range Plan. The Special Project Funding is intended to further complement ongoing programs by encouraging the direct participation of additional shipyards through small, special efforts and by promoting actual yard implementation of program results through films, special presentations, workshops, training, etc.

The FY-82 proposals address priority industry needs as expressed by consensus agreement reached by Panel SP-6. These particular requirements are:

- The need for a reduction in administrative and technical manhours in preparing and reviewing purchase documents.
- The need to eliminate repetitious preparation, submittal, and approval procedures for common items frequently used for follow-on contracts.
- The need for the Navy to recognize and adopt commercial shipbuilding standards wherever practical into their shipbuilding specifications.
- The need to provide for immediate implementation of high priority recommendations originating from the U.S. Shipbuilding Standards Program Long Range Plan.

#### Task S-32, "Standard Bid Response Sheets"

The objective of this task is to provide standardized parameters for defining operating and performance characteristics of main and auxiliary equipment and for developing a standard format for the review and evaluation of bid responses.

#### Task S-33, "Mechanical Design/Construction Standards-Group IV"

This project provides for development of a selected group of shipbuilding construction standards considered to be of overall benefit to the marine industry as selected from an extensive list of candidate items proposed by the shipbuilding industry. The standards are intended to simplify and improve communication and understanding between production personnel, designers, and ship operators. Implementation of these standards in the shipbuilding industry will result in reduced shipbuilding costs and shortened schedule durations. The standards to be developed are: foam and fire station cabinets, standard thermometer and gage selection charts, shot blast procedures for descaling the interior of steel pipe, construction of Macomb type strainers, fabrication of large plate flanges 14" and above, construction of striker plates, and forming flanged pipe/tube ends for lap joint flanges.

#### Task S-34, "Commercialization of GENSPECS for Ships of the U.S. Navy"

This will involve a review of the Navy's "GENSPECS" to identify specific priority areas where Naval and commercial standards and specifications can be improved, consolidated and interchanged.

#### Task S-35, "Hull Design/Construction Standards-Group II"

This task is intended to develop a second group. of standards for such commonly used hull items as watertight life jacket stowage lockers, fire station arrangements, deck stands, floodlight foundations, and ductwork penetration details.

#### "Long Range Plan Implementation-Phase I"

This project is one of the major tasks developed for the FY-82 program. It is intended to provide immediate funding to implement high priority recommendations originating from the U.S. Shipbuilding Standards Program Long Range Plan in advance of FY-83. The sub-tasks of the long range plan specify development of an outline of program goals based on industry needs, defining the objectives to achieve these goals, and ordering priorities to ensure maximum near term benefits in pursuit of these objectives.

#### "FY-82 Special Development Project Funding"

To provide funding for short term, high priority special efforts. J. J. McMullen Associates' proposal to develop a series of functional design diagrammatic drawings for such subsystems as the multi-stage flash distilling plant; geared steam turbine lube oil unit; fuel oil service unit; and ship service air compressor unit; fall within this category.

#### Administration

Administration of the FY-82 Standards Program will be accomplished by Bath Iron Works Corporation as Manager of the Ship Producibility Research Program in conjunction with its contractual obligation with the Maritime Administration Office of Advanced Ship Development.

#### Performance Period

The estimated performance period for the FY-82 Program Tasks will be from January 1, 1982 through July 1, 1983.



NATIONAL SHIPBUILDING STANDARDS PROGRAM UPDATE

NOVEMBER, 1981

| <u>Project Title</u>                                     | <u>Objective</u>  | <u>Status/Comments</u>  |
|--|---|---|
| S-31 Shaft Alignment Standards                           | To develop standard practices for shaft alignment for: (1) geared steam turbine inboard shafting; (2) diesel drive outboard shafting; (3) geared steam turbine outboard shafting, arrangements. | Complete and in ASTM Committee F-25 for review.   |
| S-22 Weld Defect Tolerance Study                         | To develop a rationale for reducing rework/repair of welds using the principles of fracture mechanics instead of workmanship-based criteria.  | Complete. Report published 6/1/81. Follow-on activities in effect on national and international levels.   |
| S-23/24 Mechanical Construction Standards, Groups I & II | To develop initial standards for frequently used items.   | Complete. Seventeen standards involved; many of which are already in use.   |
| S-25 HVAC Construction Standards                         | To develop standards for common shipboard HVAC system details.  | About 80% complete. Ten items involved in this project.   |
| S-26 Navy Weld Defect Study                              | A supplement to S-22, focusing on Naval ship construction welding practices.  | Complete. Report published March, 1981. NZVSEA formed a weld defect study group to evaluate recommendations contained in the report.  |
| S-27 Outfit Construction Standards                       | To develop initial standard for equipment which have general application and frequency of use.  | About 60% complete at the time the subcontractor stopped work on the project due to a major realignment of company policy. Negotiations currently underway with another shipyard to resume this task. |
| -28 Standard Piping Material Schedule                    | To update the MarAd schedule of pipe, fittings and valves last revised in 1969.   | Proceeding with draft development of selected piping systems in accordance with user review comments.   |
| -29 U.S. Shipbuilding Standards Program Long Range Plan  | To provide direction for near-term, mid-term, and long-term priorities for standardization development  | The recommended Long Range Plan Final Report is scheduled to be published and distributed by the end of 1981.   |

| <u>Project Title</u>                                     | <u>Objective</u>  | <u>Status/Comments</u>  |
|--|---|---|
| S-30 Mechanical Construction Standards, Group III        | A continuation of the previous projects addressing standards development of high priority candidate task for mechanical products.             | Work started 8/31/81. Questionnaire being developed to obtain user comments and input.  |
| S-31 QA/QC Acceptance Standards                          | To identify and develop universally understood Levels of performance.   | Work started May, 1981. Current efforts include distribution of a survey data sheet and visits to selected shipyards to obtain consensus of priority recommendations. |
| S-32 Equipment Purchase Specifications                   | To provide standardized parameters for defining characteristics of major equipments and for evaluating bid responses.                         | Part of the FY-82 Standards Program Proposal submitted to MarAd 9/15/81 for funding and authority to proceed.   |
| S-33 Mechanical Design\ Construction Standards, Group IV | A further continuation of the development of a comprehensive set of standards for mechanical equipments of repeated usage aboard ships.       | FY-82 Program Proposal.   |
| S-34 GENSPEC Review                                      | To review the Navy's GENSPEC to identify specific areas where Naval and commercial standards/specifications may be consolidated or exchanged. | FY-82 Program Proposal.   |
| S-35 Hull Design/ Construction Standards, Group II       | To develop a second group of standards of high priority items.  | FY-82 Program Proposal.   |
| Long Range Plan Implementation-Phase I                   | To provide immediate funding for implementing priority recommendations outlined in the final report in advance of FY-83 program proposals.    | FY-82 Program Proposal.   |
| Special Development Project Funding                      | To provide funding for short term special efforts such as workshops, training seminars consulting services, public relations activities, etc. | FY-82 Program Proposal.   |

## PART II

### ASTM COMMITTEE F-25 VOLUNTARY STANDARDS DEVELOPMENT

#### Membership

Voluntary representation on ASTM Committee F-25 on Shipbuilding continues to show a rising trend in membership status as the National Shipbuilding Standards Program achieves greater industry-wide acceptance.

Government support by such agencies as the Navy, MarAd, and U.S. Coast Guard is maintained at a high level both administratively, technically, and financially. For example, in regard to funding for the FY-82 Research Program, MarAd advises that their portion of the FY-82 budget is intact and the Navy has confirmed their intention to provide additional allocations in the amount of \$2.4 million to permit full funding for the FY-82 recommended programs.

#### Organization

The slate of officers elected for the 1982-1983 term of office comprises the following:

|                   |                                      |
|-------------------|--------------------------------------|
| Chairman          | W. H. Hunley, CDI Marine Co.         |
| 1st Vice Chairman | E. A. Schorsch, Bethlehem Steel Co.  |
| 2nd Vice Chairman | Radm. T. M. Hopkins, USN, NAVSEA     |
| 3rd Vice Chairman | H. F. Greiner, Sealol, Inc.          |
| Secretary         | Samuel Wolkow, Bath Iron Works Corp. |

#### Technical Subcommittees and Chairmen

|         |  |
|---------|--|
| F-25.01 | <u>Materials</u><br>J. C. West, Bethlehem Steel, Beaumont, TX      |
| F-25.02 | <u>Coatings</u><br>B. J. Fultz, Offshore Power Systems             |
| F-25.03 | <u>Outfitting</u><br>N. M. Stiglich, Eness R & D Corp.             |
| F-25.04 | <u>Hull Structure</u><br>W. M. Hannan, American Bureau of Shipping |
| F-25.06 | <u>Ship Control &amp; Automation</u><br>M. E. Resner, NAVSEA (525) |

|         |   |
|---------|---|
| F-25.07 | <u>General Support Requirements</u><br>S. H. Bailey, Avondale Shipyards |
| F-25.08 | <u>Deck Machinery</u><br>D. G. Pettit, NAVSEA (5141)                    |
| F-25.10 | <u>Electrical/Electronics</u><br>Open                                   |
| F-25.11 | <u>Machinery</u><br>B. J. Walsh, NAVSEA (PMS 301)                       |
| F-25.12 | <u>Welding</u><br>F. M. Couch, Bethlehem Steel Co.                      |
| F-25.13 | <u>Piping</u><br>H. F. Greiner, Sealol, Inc.                            |

Within the technical subcommittees several task groups have been organized to develop standards in allied categories. Consequently a substantial amount of additional standards are being developed through the voluntary consensus system.

#### Progress to Date

Currently ten standards have been approved as full consensus standards by the committee letter ballot process. They include the following:

|   |         |
|---|---------|
| 5 and 10 gal. Oil Dispensing Tank         | F670-80 |
| Use of Branch Connections                 | F681-80 |
| Sleeve Type Pipe Couplings                | F682-80 |
| Thermal Insulation for Machinery & Piping | F683-80 |
| Bolting Length Selection                  | F704-81 |
| Modular Gage Boards                       | F707-81 |
| Use of Rigid Pipe Hangers                 | F708-81 |
| Paint Product Data Sheet                  | F718-81 |
| Gage Piping Assemblies                    | F721-81 |
| Welded Joint Design                       | F722-81 |

There are approximately seventy other standards in various stages of development at the subcommittee level as full consensus standards, which requires concurrence among the several elements of the shipbuilding community that have an interest in the development and/or use of the standards. In ASTM phraseology, these include producers, users, ultimate consumers, and representatives of government and academia who actually participate in the work of Committee F-25 on Shipbuilding Standards.

Although the consensus standard system and ballot action process is a deliberate and time-consuming procedure, the progress

achieved by F-25 in only three years of existence attests to its successful operation and promotion of the standards program on the national level.

#### Panel SP-6/F-25 Interface

SNAME Panel SP-6 is in effect the steering committee for the shipbuilding industry's standards program, and as a result has been able to accelerate standards development through the voluntary consensus system of Committee F-25. For example, standards, specifications, or practices which evolve from the SNAME/MarAd sponsored shipbuilding standards program are referred to the applicable ASTM Committee F-25 technical subcommittee for further processing through the consensus ballot system for eventual adoption as ASTM National Standards.

#### ASTM Committee F-25 Update

Recognizing the need to obtain industry-wide support and involvement in order to advance the standards program on the national, industry and in-house levels, Committee F-25 has organized a series of workshops addressing the concerns of each segment of the shipbuilding industry.

The first workshop focused on shipbuilders' problems with particular emphasis on productivity improvement, application of advanced technology concepts, quality control and inspection acceptance criteria, resolution of conflicting requirements invoked by the regulatory agencies/classification societies, simplification of vessel delivery documentation/certification, test and trial requirements, etc.

The second workshop was devoted to matters of interest to Owners/Operators of both naval and merchant marine fleets. Topics highlighted at this workshop included ways and means to reduce operating costs, maintenance and repair problems, spare parts availability and inventory control practices, reliability and maintainability of equipment, accessibility of equipment for M & R considerations, need for a standards product list particularly for motors and valves, simplification of instruction books and engineers' operating manuals, etc.

The third in the series of workshops was organized for the Vendor/Supplier community at the suggestion of RAdm. E. J. Otth, Deputy Commander for Acquisition of the Naval Sea Systems Command, and Vice-Chairman of Committee F-25 up to the time of his retirement in June, 1981. He expressed the Navy's concern about industry's ability to support the administration's plans to increase ship construction programs and stressed the need for developing and implementing a concerted standards effort to improve industrial producibility to build and operate new ships cheaper and faster.

RAdm. Otth also referred to a SECNAV report which recommended greater emphasis on the Manufacturing Technology program in order to strengthen the industrial productivity base and proposed that this concept be further studied and developed within the F-25 organizational structure.

Ninety-four representatives from over forty major manufacturing firms attended the workshops and discussed such topics as the need to simplify purchasing and plan approval procedures, the need to reduce manufacturing lead times for critically needed equipment, and the need to establish multi-year procurement practices to ensure a constant market for marine equipment suppliers.

It was the consensus opinion of the workshop participants that if the U.S. Shipbuilding Industry is to achieve production equality with foreign shipbuilders, standardization of equipment will be an essential component for improving our competitiveness in world markets.

The Proceedings of the Vendor/Supplier Workshop are currently being printed and should be available for publication in the very near future.

A fourth workshop is being planned for Naval Architects/Design Agents for the May, 1982 ASTM Committee F-25 meeting which is scheduled to be held in Philadelphia, PA for the purpose of coordinating the design/production process which is so prevalent in current advanced technology programs.

The committee's sponsorship of these workshops is part of an innovative program to attract previously uninvolved owners, shipbuilders, suppliers, design agents, and academia into the standards profession in order to achieve an integrated industry-wide effort.

#### Future Plans

The U.S. Shipbuilding Standards Program Long Range Plan, which is scheduled to be published by the end of December, 1981, outlines a program for standards development for short-term (2-3 years), mid-term (5-7 years), and long term (10-20 years) priorities. The plan addresses the logic and basic considerations for establishing standardization goals, means to categorize and prioritize standards development and implementation, and other necessary guidelines to execute the long-range plan. The necessary organizational structures to manage the program on the national, industry, and shipbuilder in-house levels is also discussed to provide for a comprehensive approach to a meaningful and effective consensus standards program.

The long range final report will be the basis for a continuing series of high priority implementation projects which will include development of such diverse standards as products standards, design/engineering standards, functional performance standards, testing/inspection standards, production process standards, and finally, accuracy and dimensional control standards.

### Conclusions

Standards development under the ASTM full consensus system involving the letter ballot process is a deliberate and time-consuming proposition, in many instances taking as long as two years to produce a committee's first standard. The standards program, which is maintained with minimal funding from MarAd and administered/cost-shared with the shipbuilding industry through the SNAME Ship Production Committee, focuses on effecting improvements in shipbuilding costs and schedule durations through the development of standard specifications, test methods, definitions and practices for design, construction, and repair of marine vessels.

The program is already making a significant contribution to shipbuilding productivity. In addition to the production manhours and material dollars saved, standards impact on two critical areas: (1) standard specifications, test methods, practices, etc. will significantly improve productivity in production support, specifically in engineering and procurement. Less time need be spent on repetitive, routine requirements, both accelerating the process and permitting allocation of key human resources to priority areas such as producibility, earlier definition of technical data, etc., and (2) standards extend beyond the scope of shipyard control to the major equipment suppliers for improved availability of essential components and material at reduced cost.

Finally, a special blue ribbon panel is being organized under the National Science Foundation to assess the impact of the MarAd funded National Shipbuilding Research Program. It is anticipated that the panel's appraisal of the standards program will be highly commendable.

### Recommendations

The various manufacturing and shipbuilding technology improvement programs sponsored by the government will demand the industry's concerted efforts for successful accomplishment. A substantial budget has been allocated for these programs over the next five year period. The National Shipbuilding Standards Program will be a key element in achieving significant reductions in design and production costs through the application of advanced shipbuilding technology of which standardization is an essential component.

Shipbuilders, Owners, Design Agents, marine equipment suppliers, and regulatory agencies presently not actively involved in the National Shipbuilding Standards Program are invited to become participating members of SNAME Panel SP-6 and ASTM Committee F-25. For further information contact:

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